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**DEVICE FOR SUPPORTING RESPIRATION****FIELD OF THE INVENTION**

The present invention pertains to a device for supporting respiration

**BACKGROUND OF THE INVENTION**

Such a device has become known from U.S. Pat. No. 6,050,262. This prior-art device has a gas mask with a connected gas filter, to which ambient air is admitted by means of an upstream fan in order to facilitate the respiration of the mask user. The fan is driven by means of an electric motor.

**SUMMARY OF THE INVENTION**

The object of the present invention is to provide an improved device for supporting ventilation, which also makes possible respiration with different respiration pressures directly at or in the access to the lungs in medical practice.

According to the invention, a device for respiration support is provided with a rotary compressor with an electric drive motor. The device is also provided with a filter arranged directly upstream in a direction of flow. The compressor is arranged directly upstream of a breathing mask or a breathing tube. A control unit is provided for setting the respiration pressure on the basis of the speed of rotation of the rotary compressor and is connected to the drive motor of the compressor.

An important advantage of the present invention arises from the compact design of the battery-operated device portable on the body of the person being respirated with the rotary compressor used as the pressure source for the breathing air, which brings about an increase in the pressure by imparting momentum to the gas being delivered. The rotary compressor is designed as a radial, axial, drum-type or cross flow compressor directly connected to a breathing mask or to a breathing tube and without connection lines or tubes, so that the support of respiration or respiration is possible directly at or in the access to the lung. In addition, different respiration pressures can be set rapidly if necessary either according to preset, selected pressure stages or in a time-dependent manner, corresponding to stored respiration pressure curves, i.e., especially with an intermittent respiration pressure curve, which is set in a highly dynamic manner solely on the basis of the speed of rotation of the compressor used with small moving masses.

An especially preferred embodiment of the present invention has a respiratory flow sensor in the breathing mask, which is electrically connected to the control unit, so that the control unit is actuated as a function of the measured signals of the respiratory flow sensor and the speed of rotation of the compressor and consequently the resulting respiration pressure for the patient or the breathing-supported person is changed highly dynamically, without a delay due to line losses. The filter, which is arranged directly upstream of the compressor and is detachably placed thereon, consists of a nonwoven or fiber material and is especially a cellulose filter that is highly effective for particle retention, including microorganisms, which is also used at the same time for sound absorption from the compressor, so that use near the patient is possible without adverse subjective effects. For respiration support, air is drawn by the compressor from the environment through the filter arranged directly upstream

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and is delivered under pressure into the breathing mask or alternatively into a breathing tube.

The compact and lightweight design of the battery-operated device according to the present invention makes possible the mobile, autonomous use of the device directly at the patient to be respirated for pressure-supported respiration with very small dead spaces and flow resistances in the path of the breathing gas. The weight of such a device for a nasally arranged breathing mask is about 100 g with dimensions of about 50 mm of edge length.

The breathing gas may be optionally conditioned in a patient-specific manner in the area of the breathing mask by means of a heater and the simultaneous feeding of humidified air and/or another auxiliary gas, e.g., oxygen or nitrogen monoxide. Furthermore, provisions are optionally made for feeding a drug aerosol or an anesthetic for the treatment of the patient.

A pressure increase generated is very extensively independent from the gas volume flow being delivered, especially for a radial compressor, so that the patient being respirated does not experience any substantial change in the respiration parameters as a function of an untightness of the breathing mask and an associated, often unavoidable leakage, which is another advantage of the present invention.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention is illustrated.

**BRIEF DESCRIPTION OF THE DRAWINGS**

In the drawings:

FIG. 1 is a schematic view of a mobile device for respiration support to be carried on the body of a person, e.g., a freely moving patient; and

FIG. 2 is an enlarged detail of the individual components of the device in its right-hand part.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to the drawings in particular, an exemplary embodiment of the present invention is shown in FIG. 1 as a mobile device for respiration support to be carried on the body of a person, e.g., a freely moving patient 1. FIG. 2 shows an enlarged detail of the individual components of the device in its right-hand part. A very compact rotary compressor 3, which is in direct flow connection with a breathing mask 2 (or other user interface part such as a breathing tube without connection lines) and is detachably connected to same as one assembly unit, is used as the pressure source. The rotary compressor 3 is especially a radial compressor, but may also be designed as an axial, drum-type or cross flow compressor.

All four compressors 3 mentioned as "rotary compressors" (designed as a radial compressor, as an axial compressor, as a drum-type compressor or as a cross flow compressor) belong to the group of the dynamic type compressors, which bring about the pressure increase in a gas being delivered by imparting momentum. The blades or vanes of the compressor 3 transmit a rotational impulse to the gas molecules flowing through corresponding to the speed of rotation, and the transmitted energy is converted